



АКТУАЛЬНІ ПИТАННЯ ДОШКІЛЬНОЇ ТА ПОЧАТКОВОЇ ОСВІТИ



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DOI: 10.58407/NI.24.3-4.1

MONITORING OF THE RESULTS OF PRIMARY SCHOOL TEACHERS' PROFESSIONAL INTERACTION IN AN INSTITUTION OF GENERAL SECONDARY EDUCATION

МОНІТОРИНГ РЕЗУЛЬТАТІВ ПРОФЕСІЙНОЇ ВЗАЄМОДІЇ ВЧИТЕЛІВ ПОЧАТКОВИХ КЛАСІВ У ЗАКЛАДІ ЗАГАЛЬНОЇ СЕРЕДНЬОЇ ОСВІТИ

The purpose of the article is to analyze the levels of primary school teachers' scientific and research competences components formation based on the results of the professional interaction in the «teacher – group of teachers», «teacher – psychological service», «teacher – school administration», «teacher – pupils» systems; to consider the peculiarities of organizing offline and online teacher co-operation for organizing pupils' research activities.

Methodology. The following methods were used: theoretical (analysis, generalization and systematization of the regulatory documents, scientific, pedagogical and psychological literature on the research problem, theoretical modeling); empirical (pedagogical experiment, study of teachers' scientific and research activities and pupils' research competences, expert evaluation of research works, observation, scaling method); statistical (processing of empirical data using methods of mathematical statistics).

Scientific novelty. Based on the statistical analysis of the results obtained to determine the levels of the primary school teachers' scientific and research competences formation who teach the integrated course «I Explore the World», and the teachers who teach the integrated course «Getting to Know Nature» in the 5th forms, the dynamics of the following components has been revealed: subject and methodical, projective, technological and digital, STEM-integrative, autopsychological, emotional and reflective, psychological and digital, differential and psychological, axiological, monitoring and dynamic, organizational and digital, acmeological, methodological, cognitive, creative, communicative and digital.

Conclusions. As a result of teachers' professional interaction, not only the dynamics of their scientific and research competences formation, but also the dynamics of primary school and the 5th form pupils' research competences formation can be observed, which indicates the provision of continuity in teaching pupils. Accordingly, the pupils of the 3rd and 4th forms have an increasing level of the research competences components formation, namely elementary skills: practical skills, project and technological skills, experimental skills, computer and information skills, generalized experimental skills. It has been experimentally confirmed that as a result of the mutual training of teachers, the number of the 5th form pupils who have formed more complex components of the research skills, compared to primary school pupils, increases.

Keywords: scientific and research competences, levels of the research competences development, components of research competences, school integrated courses.

Мета статті. Проаналізувати рівні сформованості компонентів науково-дослідницьких компетентностей вчителів початкових класів за підсумками професійної взаємодії в системах «учитель-група вчителів», «вчитель-психологічна служба», «учитель-адміністрація закладу», «вчитель-учні». Розглянути особливості організації співпраці вчителів офлайн та онлайн для організації дослідницької діяльності учнів.

Методи дослідження. Застосовано такі методи: теоретичні (аналіз, узагальнення та систематизація нормативно-правових документів, науково-педагогічної та психологічної літератури з проблеми дослідження, теоретичне моделювання); емпіричні (педагогічний експеримент, вивчення науково-дослідницької діяльності учителів та дослідницьких компетентностей учнів, експертне оцінювання дослідницьких робіт, спостереження, метод шкалювання); статистичні (обробка емпіричних даних із використанням методів математичної статистики).

Наукова новизна. На основі статистичного аналізу одержаних результатів для визначення рівнів сформованості науково-дослідницьких компетентностей учителів початкових класів, які викладають інтегрований курс «Я досліджую світ», та вчителів, які викладають інтегрований курс «Пізнаємо природу» у 5-х класах, виявлено динаміку таких компонентів: предметно-методичного, проєктивного, технологічно-цифрового, STEM-інтегративного, аутопсихологічного, емоційно-рефлексивного, психологічно-цифрового, диференційно-психологічного, аксіологічного, моніторинго-динамічного, організаційно-цифрового, акмеологічного, методологічного, когнітивного, креативного, комунікаційно-цифрового.

Висновки. У результаті професійної взаємодії вчителів спостерігається не лише динаміка формування їх науково-дослідницьких компетентностей, а й динаміка формування дослідницьких компетентностей учнів початкової школи та учнів 5-х класів, що вказує на забезпечення наступності в навчанні учнів. Відповідно в учнів 3-4-х класів зростає рівень сформованості складових дослідницьких компетентностей, а саме елементарних: умінь практичного характеру, проєктно-технологічних умінь, експериментальних умінь, інформаційних та інформаційних умінь, узагальнених експериментальних умінь. Експериментально підтверджено, що, за підсумками взаємонавчання вчителів, збільшується кількість учнів 5-х класів, у яких сформовано більш складні, ніж в учнів початкових класів, складові дослідницьких умінь.

Ключові слова: науково-дослідницькі компетентності, рівні сформованості дослідницьких компетентностей, компоненти дослідницьких компетентностей, шкільні інтегровані курси.

Introduction. The exchange of experience between pedagogical workers in today's conditions needs to take into account the need to combine online and offline cooperation. This requires the practical use of modern forms of work that ensure self-learning, mutual learning, and raising the professional level of pedagogical workers. The exchange of experience between pedagogical workers in different systems is of particular importance: «teacher-school administration», «teacher-group of teachers», «teacher-psychological service of the school», «teacher-students». Accordingly, the selection of new effective forms of interaction of pedagogical workers needs to take into account the educational trends indicated in modern literature.

Analysis of the latest research. To choose modern forms and methods of interaction between primary and basic school teachers, we analyzed the principles of organizing their professional interaction. The following were chosen among them: the principle of effective cooperation (trust in relations and relations; dialogue – interaction – mutual respect; social partnership – equality of parties, voluntary acceptance of obligations, obligation to fulfill agreements) (Lilik & Sazonova, 2020); the principle of individualization (respect for the individual; benevolence and positive attitude) (Strilets et al., 2020); the principle of democratization (distributed leadership – the right to choose and responsibility for it, proactivity) (Onopriyenko & Skvortsova, 2024). Interaction is seen as a form based on openness, accessibility, horizontal connections and attitudes, during which a community of progressive educators is formed. They are able to respond to modern challenges and radically change educational approaches to their own learning and their professional mission. We will analyze the following principle of organizing professional interaction of primary and basic school teachers – the principle of individualization, which directly reflects personally oriented learning and the basic requirements for the organization of inclusive education in an educational institution. The regulatory documents for general secondary education in Ukraine are aimed at ensuring the principle of individualization of student learning and provide for the creation of conditions for the realization of the personal potential of education seekers, taking into account their abilities, motivation. We agree with the opinion of P. Shevchuk (2019) that the use of information technologies in training allows to effectively and systematically overcome a number of educational and methodical and organizational problems in general. Accordingly, the individual use of an educational blog creates conditions for the realization of the following professional functions: cognitive, communicative, informational, methodical.

Individualization is of particular importance for the exchange of experience between teaching staff during the organization of inclusive education of students. According to the research of I. Turchyna et al. (2023) improving the education is becoming a permanent process that takes into account compliance with the principles of humanization and individualization. Thus, our analysis of modern scientific and pedagogical literature allowed us to state that professional cooperation of teachers on the basis of individualization, democratization, and effective cooperation involves a combination of online and offline interaction of participants in the educational process. According to the research of I. Turchyna et al. (2023) individualization of professional interaction is facilitated by the introduction of synchronous and asynchronous training, which gained particular popularity in the conditions of war and COVID-19 pandemic. We agree with the opinion of the mentioned authors that in today's globalized environment, traditional pedagogical means of teaching and upbringing, as well as the non-innovative organization of the educational process, are increasingly proving to be ineffective (compared to innovative methods).

Methodology. We conducted an experiment to determine the effectiveness of professional offline and online interaction of elementary and basic school teachers on the formation of students' research competencies. He envisaged several stages. The first or ascertaining-organizational stage (2021-2022): creation of mixed experimental groups and control groups of teachers who teach science and mathematics disciplines in primary and basic schools based on diagnostics. The second or the formative stage (2022-2023) involved the implementation in practice of the structural-functional model of professional interaction of primary and basic school teachers for the formation of students' research competencies. The third or the final stage (2023-2024) included the final diagnosis, which involved determining the level of formation of students' research competences and teachers' research competences. The method of mathematical statistics (χ^2 – Pearson's criterion) was used to check the effectiveness of professional interaction offline and online based on the structural-functional model developed by us.

During the online interaction of pedagogical workers in the electronic educational environment for the purpose of teaching integrated courses, attention was paid to the stages of preparation and sharing of experience in the organization of research activities of primary and basic school students. The first stage was the familiarization of teachers with modular curricula for their independent individual selection of topics for research, which are common to study in primary and basic schools. The second stage consisted in teachers

performing a number of individual tasks and discussing their results in a group based on Google meet. The third stage consisted in the independent creation by teachers of research algorithms for elementary school students using the example of a task with integrative content formulated by the coordinator. Thematic electronic educational modules are combined into a single unit for the qualitative organization of students' research activities when teaching the integrated courses «I explore the world» (2022) in elementary school and «Getting to know nature» (2021) in basic school. The material posted in Google Classroom is combined into special educational modules according to the topics chosen for individual independent study by teachers and further discussion during offline interaction. Each electronic educational module provided for a single structure and contained: materials for theoretical familiarization with the subject chosen for study; auxiliary video material that reveals the peculiarities of using theoretical knowledge in practice; knowledge test online – at any time convenient for teachers. The development of tasks for teaching staff took into account the possibility of conducting an assessment for all participants or a selective assessment according to a scale created by the course coordinator. The electronic resource made it possible to set evaluation criteria and the deadline for submission of materials. For the online interaction of primary and basic school teachers with the course coordinator in the electronic educational environment. The professional offline interaction of elementary and basic school teachers based on the work shop involved not only the organization of students' research activities when teaching integrated courses, but also the formation of teachers' research competencies. When creating tasks for users, the following technical capabilities of the GSuite for Education system were provided: downloading materials from Google Drive, You Tube; creating documents, presentations, tables, drawings, adding calls to electronic educational resources.

The offline cooperation of teachers in the **«teacher – group of teachers»** system based on the **work shop** involved such activities: joint discussion of the research algorithm on the example of one of the topics provided for by the Standard educational program of the integrated course «I explore the world»; making changes to the research algorithm for organizing the work of students in basic school during the study of the integrated course «Learning about nature»; independent formulation by group members of research tasks of integrative content separately for elementary and basic school students on a topic set by the coordinator.

The implementation of the structural-functional model of professional interaction of

primary and basic school teachers for the formation of students' research competences provided for the following areas of offline interaction (**«World Cafe»**) in the **«teacher – school psychological service»** system: the selection of the content of integrative tasks in accordance with the nosology specified by the tutor separately for primary and basic school students, taking into account the didactic capabilities of modern electronic educational resources; peer review of completed tasks by small groups of teachers; presentation of the results of the discussions: coordination of the content, forms and methods, of performance by students with special educational needs of research tasks on the chosen topic, taking into account the students' nosologies.

Determination of the sequence of research stages of primary and basic school students during their implementation of STEM projects (identification of common and distinctive features in the practical work of schoolchildren, taking into account their level of training in accordance with age characteristics); identifying the features of the preparation by primary and basic school students of the general estimate of the STEM project proposed by them. The formation of scientific and research competencies of primary and basic school teachers also involved their offline interaction based on the **«Facilitation Session»** form of interaction, which required the appropriate didactic filling of the structural and content block **«teacher – school administration»**. Interaction during facilitation took place in the following directions:

- preparation of practical tasks of integrative content for students with the aim of transforming virtual models into real ones, taking into account the criteria of formative assessment of the abilities and skills of elementary and basic school students;
- the selection of research tools in accordance with the topics set by the facilitator, followed by the construction and programming of models of robotic devices based on the use of ready-made program blocks, the production of models of design projects;
- reflection between the participants of the interaction with the aim of drawing up joint recommendations for improving the content of educational modules for the preliminary online training of teachers for the organization of student STEM projects, proposals for forms and methods of working with teachers during offline interaction with the aim of improving the formation of their scientific and research competencies.

The results of professional interaction for the experimental and control groups of teachers presented in Table 1.

Table 1

Levels of formation of components of scientific and research competencies of teachers of the experimental group (35 teachers) and control group (34 teachers)

Components of scientific and research competencies	Levels of components of scientific and research competencies					
	experimental group			control group		
	low	average	high	low	average	high
subject-methodical	3	18	14	8	16	10
projective	2	17	16	11	12	11
technological and digital	5	20	10	14	14	6
STEM-integrative	3	19	13	15	12	7
autopsychological	5	18	12	6	15	13
emotionally reflective	2	21	12	12	16	6
psychologically digital	9	18	8	12	12	10
differential and psychological	6	19	10	11	14	9
axiological	4	17	14	14	14	6
monitoring and dynamic	2	16	17	15	14	5
organizational and digital	4	13	18	8	24	2
acmeological	3	20	12	11	14	9
methodological	7	16	12	14	13	7
cognitive	4	17	14	12	14	8
creative	6	13	16	8	6	10
communication and digital	9	13	13	12	12	10

Therefore, the experimental and control groups of primary and basic school teachers are quite similar in their composition, i.e. teachers of both groups had approximately the same level of formation of scientific and research competencies at the beginning of the experimental study. Accordingly, the results of diagnostics for the control group of primary and basic school teachers were analyzed. The found value of the formation of scientific and research competencies of the members of the experimental and control groups is taking into account that one of the criteria for the formation of scientific and

research competences of teachers is a criterion that reflects the formation of research competences of students. Experimental and control groups of students of the 3rd, 4th, 5th grades were created in Chernihiv gymnasium №35. To make sure that the experimental and control groups of students are sufficiently similar in their composition, we used K. Pearson's criterion. The results of interaction for the experimental group (30 students of the 3rd grades) and control group (30 students of the 3rd grades) presented in Table 2.

Table 2

Levels of formation of components of research competencies of experimental group (30 students of the 3rd grades) and control group (30 students of the 3rd grades)

The name of the levels of skills	Levels of components of research competencies					
	experimental group			control group		
	low	average	high	low	average	high
elementary skills of a practical nature	4	14	12	8	16	6
elementary project and technological skills	3	13	14	4	18	8
elementary experimental skills	2	10	18	14	12	4
elementary information and computer skills	2	12	16	17	10	3
elementary generalized experimental skills	4	9	17	18	8	4

The obtained values $0,64 \leq 5,99$ for students of the 3rd grades; $0,36 \leq 5,99$ for students of the 4th grades; $1,77 \leq 5,99$ for students of the 3rd grades. Therefore, the experimental and control groups of students are quite similar in their composition, i.e. students of both groups had approximately the same level of formation of research competencies at the beginning of the experimental study. This indicates a positive dynamic in the formation of scientific and research competences of primary

and basic school teachers who are part of the experimental group. For students of the 3rd grades of the experimental group, elementary experimental skills are the most developed at a high level (18 students – 59.94%). Pupils of the control group mostly have formed elementary skills of a practical nature at the average level (16 pupils – 53.28%). The results for the experimental group (30 students of the 4th grades) and control group (31 students of the 4th grades) presented in Table 3.

Table 3

Levels of formation of components of research competencies of experimental group (30 students of the 4th grades) and control group (31 students of the 4th grades)

The name of the levels of skills	Levels of components of research competencies					
	experimental group			control group		
	low	average	high	low	average	high
elementary skills of a practical nature	2	11	17	4	17	10
elementary project and technological skills	3	12	15	6	17	8
elementary experimental skills	3	15	12	9	16	6
elementary information and computer skills	2	16	12	7	20	4
elementary generalized experimental skills	2	14	14	8	19	4

The obtained values for 4th-grade students allowed us to state that elementary generalized experimental skills of 14 students (46.67%) are the most developed at the high level. In the control group, elementary gene-

ralized experimental skills were formed at a high level only in 4 students (12.90%). The results for the experimental group (30 students of the 5th grades) and control group (30 students of the 5th grades) presented in Table 4.

Table 4

Levels of formation of components of research competencies of experimental group (30 students of the 5th grades) and control group (30 students of the 5th grades)

The name of the levels of skills	Levels of components of research competencies					
	experimental group			control group		
	low	average	high	low	average	high
basic skills of a practical nature	7	11	12	7	19	4
basic project and technological skills	4	15	11	8	16	6
basic experimental skills	2	21	7	4	21	5
basic information and computer skills	3	18	9	7	19	4
basic generalized experimental skills	4	14	12	4	24	2

The obtained values for 5th grade students demonstrate that for the experimental group the most developed at the average and high levels, respectively, are: basic project and technological skills (in 15 students – 49.95% and in 11 students – 36.63%), basic experimental skills (21 students – 69.93% and 7 students – 23.31%). To check the effectiveness of the selected forms and methods of forming the research competences of students of the 3rd, 4th, 5th grades, who are part of the experimental groups, statistical methods were used based on the statistical hypothesis, which was conditionally called «null» H_0 : the studied samples have the same distribution law, and the differences in the results of the samples are explained by random reasons; in fact, the level of research competences in experimental groups of students of 3rd, 4th, 5th grades and in control groups is the same. The validity of the hypothesis H_0 was checked by comparing it with an alternative hypothesis H_1 : the level of formation of research competences of students of 3rd, 4th, 5th grades in experimental groups and in control groups is different due to non-random factors. The found values χ^2_{emp} of the formation of research competences of students of the experimental group and the control group of educational institutions are as follows: for 3rd grade students $\chi^2_{emp} = 9,81$, for 4rd grade students

$\chi^2_{emp} = 18,91$, for 5rd grade students $\chi^2_{emp} = 13,52$.

Its mean that $\chi^2_{emp} \geq \chi^2_{krit}$, $\chi^2_{krit} = 5,99$. Therefore, H_0 is rejected and H_1 is accepted. This indicates a positive dynamic in the formation of research competences of primary and basic school students who are part of the experimental group.

Conclusions. The results obtained as a result of the experimental research allow us to assert:

- cooperation and mutual learning of primary and basic school teachers who teach science and mathematics disciplines in 3rd, 4th and 5th grades under the conditions of the implementation of our proposed structural-functional model of professional interaction for the formation of research competences of students in experimental groups has a dynamic character, as evidenced by the results of the formation of scientific and research competences of teachers and research competences of students;

- online and offline cooperation of primary and basic school teachers in experiential groups under the conditions of implementation of the structural-functional model of professional interaction contributes to the formation of emotional-reflexive, differential-psychological, organizational-digital, STEM-integrative, psychological-digital and cognitive components in pedagogical workers.

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Стаття надійшла до редакції 21.12.2024